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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/708,771	03/24/2004	Gopal B. Avinash	142427	2770

23413 7590 07/27/2007
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EXAMINER	
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ART UNIT	PAPER NUMBER
2609	

MAIL DATE	DELIVERY MODE
07/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/708,771	AVINASH ET AL.	
	Examiner	Art Unit	
	Michael Vanchy Jr.	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/29/2004 and 03/24/2004*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 13, and 18-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Riglet et al. US 5,631,975.

Re claim 1, a method for processing a digital image, the method comprising: estimating a foreground region relating to an imaged object (Riglet et al., col. 4, lines 14-17, "***In the embodiment described here, the object is to distinguish automatically the zone corresponding to the face of the speaker (and the upper part of the chest)*** *from the fixed background.*");

estimating a background region relating to other than the imaged object (Riglet et al., col. 4, lines 14-17, "*In the embodiment described here, the object is to 3distinguish automatically the zone corresponding to the face of the speaker (and the upper part of the chest) from* ***the fixed background.***");

and by using the image, the estimated foreground region and the estimated background region, calculating a transition region disposed between the foreground region and the background region (Riglet et al., col. 4, lines 25-31, *"As FIG. 2 shows, the device 100 comprises first a circuit 101 for determining the silhouette by a calculation of the difference (here pixel by pixel) between these images in accordance with the following formula for obtaining an average difference which renders it possible to take into account fluctuations in the movements of the head and chest.")*;

wherein the estimated foreground region, the estimated background region, and the calculated transition region, each comprise a separate set of pixels that may each be processed separately for suppressing pixel intensities in the estimated background region and improving image quality (Riglet et al., col. 4, lines 41-51, *"This difference is then compared with a threshold THRE1 (of a few units, for example 4) for separating the useful signal from the background noise: if the difference is greater than the threshold, DIFF(i,j)=255 is taken (maximum in the scale of the 256 luminance levels from 0 to 255), the corresponding pixel being considered a moving pixel in the succession of images considered and thus belonging to the person, if not, the present pixel is considered static and is thus given a zero luminance*

*DIFF(i,j)=0. This calculation of a difference through **suppression of the background** on the basis of the movement…").*

Re claim 2, the method of claim 1, wherein: the estimating a foreground region comprises defining an initial foreground region as that region containing those pixels of the image meeting a first criterion; and the estimating a background region comprises defining the background region as that region containing those pixels of the image meeting a second criterion (Riglet et al., col. 5, lines 11-15, "When this operation has been completed, the zone corresponding to the background is filled with black pixels, whereas that corresponding to the person is for the major part filled with white pixels.").

Re claim 3, the method of claim 2, wherein the first criterion comprises a pixel intensity greater than a first threshold (Riglet et al., col. 4, lines 41-48, *"This difference is then compared with a threshold THRE1 (of a few units, for example 4) for separating the useful signal from the background noise: **if the difference is greater than the threshold**, DIFF(i,j)=255 is taken (maximum in the scale of the 256 luminance levels from 0 to 255), the corresponding pixel being considered a moving pixel in the succession of images considered **and thus belonging to the person.**").*

Re claim 4, the method of claim 2, wherein the second criterion comprises a pixel intensity less than a second threshold (Riglet et al., col. 4, lines 41-50, *"This difference is then compared with a threshold THRE1 (of a few units, for example 4) for separating the useful signal from the background noise: if the difference is greater than the threshold, DIFF(i,j)=255 is taken (maximum in the scale of the 256 luminance levels from 0 to 255), the corresponding pixel being considered a moving pixel in the succession of images considered and thus belonging to the person,* ***if not, the present pixel is considered static and is thus given a zero luminance DIFF(i,j)=0.****"*).

Re claim 5, the method of claim 2, wherein the calculating a transition region comprises calculating the transition region as that region containing those pixels of the image meeting a third criterion (Riglet et al., col. 17, lines 15-21, *"First a fringe region RB is defined of a width of a few pixels (here 5, 3, or 10 pixels, depending on whether the CIF, QCIF or 4/3 format is involved), which runs all along the edge of each window and which forms a* ***transition zone in which the luminance will be made to vary****, here in linear fashion, thus creating a kind of gradient."*).

Re claim 13, the method of claim 5, further comprising: defining an object region as the union of the initial foreground region and the initial transition region, and performing at least one morphological operation on the object region (Riglet et al., Fig. 8 and col. 12, lines 20-31, *"To determine the displacements dx.sub.i, dy.sub.i of the various characteristic points i through translation and rotation, the displacement of the windows defined in characteristic zones of the face are followed as indicated in FIG. 8. Supposing that the person remains in the same plane throughout the sequence (to avoid having to take into account depth movements), the object is to find for each window of a given image, as shown in the said Figure, that one from among the windows which resembles it most inside a searching zone situated in the image following the said given image, by a resemblance criterion which is, for example, that of finding the minimum absolute error."*).

Re claim 18, a computer program product for processing a digital image, the product comprising: a storage medium, readable by a processing circuit, storing instructions for execution by the processing circuit for (Riglet et al. Fig. 1 and Fig.2, in Fig.1, item 300 shows that the information can be receiving and updating by the processing circuit 250, Fig. 2),

estimating a foreground region relating to an imaged object (Riglet et al., col. 4, lines 14-17, *"**In the embodiment described here, the object is to distinguish automatically the zone corresponding to the face of the speaker (and the upper part of the chest)** from the fixed background."*);

estimating a background region relating to other than the imaged object (Riglet et al., Fig. 2, and col. 4, lines 14-17, *"In the embodiment described here, the object is to distinguish automatically the zone corresponding to the face of the speaker (and the upper part of the chest) from **the fixed background**."*);

and by using the image, the estimated foreground region and the estimated background region, calculating a transition region disposed between the foreground region and the background region (Riglet et al., Fig. 2, and col. 4, lines 25-31, *"As FIG. 2 shows, the device 100 comprises first a circuit 101 for determining the silhouette by a calculation of the difference (here pixel by pixel) between these images in accordance with the following formula for obtaining an average difference which renders it possible to take into account fluctuations in the movements of the head and chest."*);

wherein the estimated foreground region, the estimated background region, and the calculated transition region, each comprise a separate set of pixels that may each be processed separately for suppressing pixel intensities in the estimated background

region and improving image quality (Riglet et al., Fig.2, and col. 4, lines 41-51, "*This difference is then compared with a threshold THRE1 (of a few units, for example 4) for separating the useful signal from the background noise: if the difference is greater than the threshold, DIFF(i,j)=255 is taken (maximum in the scale of the 256 luminance levels from 0 to 255), the corresponding pixel being considered a moving pixel in the succession of images considered and thus belonging to the person, if not, the present pixel is considered static and is thus given a zero luminance DIFF(i,j)=0. This calculation of a difference through* ***suppression of the background*** *on the basis of the movement…*").

Re claim 19, the product (Riglet et al. Fig. 1, Fig. 2) of claim 18, wherein: the estimating a foreground region comprises defining an initial foreground region as that region containing those pixels of the image meeting a first criterion; and the estimating a background region comprises defining the background region as that region containing those pixels of the image meeting a second criterion (Riglet et al., col. 5, lines 11-15, "When this operation has been completed, the zone corresponding to the background is filled with black pixels, whereas that corresponding to the person is for the major part filled with white pixels.").

Re claim 20, the product (Riglet et al. Fig. 1, Fig. 2) of claim 19, wherein the first criterion comprises a pixel intensity greater than a first threshold (Riglet et al., col. 4, lines 41-48, *"This difference is then compared with a threshold THRE1 (of a few units, for example 4) for separating the useful signal from the background noise:* ***if the difference is greater than the threshold****, DIFF(i,j)=255 is taken (maximum in the scale of the 256 luminance levels from 0 to 255), the corresponding pixel being considered a moving pixel in the succession of images considered* ***and thus belonging to the person.****"*).

Re claim 21, the product (Riglet et al. Fig. 1, Fig. 2) of claim 19, wherein the second criterion comprises a pixel intensity less than a second threshold (Riglet et al., col. 4, lines 41-50, *"This difference is then compared with a threshold THRE1 (of a few units, for example 4) for separating the useful signal from the background noise: if the difference is greater than the threshold, DIFF(i,j)=255 is taken (maximum in the scale of the 256 luminance levels from 0 to 255), the corresponding pixel being considered a moving pixel in the succession of images considered and thus belonging to the person,* ***if not, the present pixel is considered static and is thus given a zero luminance DIFF(i,j)=0.****"*).

Re claim 22, the product (Riglet et al. Fig. 1, Fig. 2) of claim 21, wherein the calculating a transition region comprises calculating the transition region as that region containing those pixels of the image meeting a third criterion (Riglet et al., col. 17, lines 15-21, *"First a fringe region RB is defined of a width of a few pixels (here 5, 3, or 10 pixels, depending on whether the CIF, QCIF or 4/3 format is involved), which runs all along the edge of each window and' which forms a* ***transition zone in which the luminance will be made to vary****, here in linear fashion, thus creating a kind of gradient."*).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claim 6, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Riglet et al., US 5,631,975 as applied to claim 5 and 22 above, and further in view of Mukherjee et al., US2005/0055658 A1.

Riglet et al. teaches the forming of a "gradient", but fails to teach a gradient magnitude that is within a gradient tolerance value, however, Mukherjee et al. does:

Re claim 6, the method of claim 5, wherein the third criterion comprises: a pixel having a pixel intensity greater than the second threshold (Riglet et al., col. 17, lines 15-21, "*First a fringe region RB is defined of a width of a few pixels (here 5, 3, or 10 pixels, depending on whether the CIF, QCIF or 4/3 format is involved), which runs all along the edge of each window and which forms a* ***transition zone in which the luminance will be made to vary****, here in linear fashion, thus creating a kind of gradient.*"),

a morphological connection to a foreground pixel (Riglet et al., Fig. 11),

and a gradient magnitude that is within a gradient tolerance value of the gradient magnitude of the foreground pixel (Mukherjee et al., Paragraph [0061], "*The image gradient is compared to a gradient tolerance (Block 605). The gradient tolerance value is pre-specified along with the input mask.* If both the gradient (and curvature values, if necessary) are less than the gradient tolerance (and curvature tolerance,

`if necessary), then no further action is needed for that segment, and the next segment is evaluated (Block 604)."`).

The examiner takes into account that having a gradient magnitude that is within a gradient tolerance value for a pixel, the pixel can be any type of pixel in the digital image including a foreground pixel.

Since both Riglet et al. and Mukherjee et al. both teach that of forming a gradient, taking their combined teachings it would be obvious then to modify Riglet et al. to go one step further and have a gradient magnitude that is within a gradient tolerance value.

Re claim 23, the product (Riglet et al. Fig. 1, Fig. 2) of claim 22, wherein the third criterion comprises:

a pixel having a pixel intensity greater than the second threshold (Riglet et al., col. 17, lines 15-21, *"First a fringe region RB is defined of a width of a few pixels (here 5, 3, or 10 pixels, depending on whether the CIF, QCIF or 4/3 format is involved), which runs all along the edge of each window and which forms a **transition zone in which the luminance will be made to vary**, here in linear fashion, thus creating a kind of gradient."*),

a morphological connection to a foreground pixel (Riglet et al., Fig. 11),

and a gradient magnitude that is within a gradient tolerance value of the gradient magnitude of the foreground pixel (Mukherjee et al., Paragraph [0061], *"The image*

gradient is compared to a gradient tolerance (Block 605). The gradient tolerance value is pre-specified along with the input mask. If both the gradient (and curvature values, if necessary) are less than the gradient tolerance (and curvature tolerance, if necessary), then no further action is needed for that segment, and the next segment is evaluated (Block 604)."). The examiner takes into account that having a gradient magnitude that is within a gradient tolerance value for a pixel, the pixel can be any type of pixel in the digital image including a foreground pixel.

Re claim 24, the product of claim 23, further comprising instructions for execution by the processing circuit for (Riglet et al. Fig. 1 and Fig.2, in Fig.1, item 300 shows that the information can be receiving and updating by the processing circuit 250, Fig. 2):

defining an object region as the union of the initial foreground region and the initial transition region, and performing at least one morphological operation on the object region (Riglet et al., Fig. 8 and col. 12, lines 20-31, *"To determine the displacements dx.sub.i, dy.sub.i of the various characteristic points i through translation and rotation, the displacement of the windows defined in characteristic zones of the face are followed as indicated in FIG. 8. Supposing that the person remains in the same plane throughout the sequence (to avoid*

having to take into account depth movements), the object is to find for each window of a given image, as shown in the said Figure, that one from among the windows which resembles it most inside a searching zone situated in the image following the said given image, by a resemblance criterion which is, for example, that of finding the minimum absolute error.").

6. Claim 7 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Riglet et al., US 5,631,975 as applied to claim 5 and 23 above, and further in view of Mukherjee et al., US2005/0055658 A1 and Harrington, US 6,580,812 B1.

Riglet et al. fails to teach calculating incremental transition regions, each having an incrementally larger gradient tolerance value, until a gradient tolerance value threshold is met or exceeded, however, Harrington does:

Re claim 7, the method of claim 5, wherein the calculating a transition region further comprises: iteratively calculating incremental transition regions, each having an incrementally larger gradient tolerance value, until a gradient tolerance value threshold is met or exceeded, wherein (Harrington, col. 2, lines, 37-41, *"Once the intensity gradients are determined, selected ones of the intensity gradients are selected. The selected gradients are greater than*

a predetermined threshold and are greater than the gradients at the adjacent points along the direction of the gradient."):

each incremental transition region is calculated to be that region containing pixels connected to a pixel of a previously calculated incremental transition region, having an intensity greater than the second threshold (Riglet et al., col. 17, lines 15-21, *"First a fringe region RB is defined of a width of a few pixels (here 5, 3, or 10 pixels, depending on whether the CIF, QCIF or 4/3 format is involved), which runs all along the edge of each window and which forms a* ***transition zone in which the luminance will be made to vary****, here in linear fashion, thus creating a kind of gradient.")*,

and having a gradient magnitude that is within the incrementally larger gradient tolerance value of the gradient magnitude of the incremental transition region pixel to which it is connected (Mukherjee et al., Paragraph [0061], "*The image gradient is compared to a gradient tolerance (Block 605). The gradient tolerance value is pre-specified along with the input mask.* If both the gradient (and curvature values, if necessary) are less than the gradient tolerance (and curvature tolerance, if necessary), then no further action is needed for that segment, and the next segment is evaluated (Block 604).").

The examiner takes into account that having a gradient magnitude that is within a gradient tolerance value for a pixel, the pixel can be any type of pixel in the digital image including a transition pixel.

All three references teach the forming of a gradient, here Harrington calculates incremental transition regions, each having an incrementally larger gradient tolerance value, until a gradient tolerance value threshold is met or exceeded. Therefore, taking the combined teachings of Riglet et al., Mukherjee et al., and Harrington as a whole, it would have been obvious to modify Riglet et al. and Mukherjee et al., since it is just another step that can be taken using the information obtained from the gradient.

Re claim 28, the product (Riglet et al. Fig. 1, Fig. 2) of claim 23, wherein the calculating a transition region further comprises: iteratively calculating incremental transition regions, each having an incrementally larger gradient tolerance value, until a gradient tolerance value threshold is met or exceeded, wherein (Harrington, col. 2, lines, 37-41, *"Once the intensity gradients are determined, selected ones of the intensity gradients are selected. The selected gradients are greater than a predetermined threshold and are greater than the gradients at the adjacent points along the direction of the gradient."*):

each incremental transition region is calculated to be that region containing pixels connected to a pixel of a previously calculated incremental transition region, having an

intensity greater than the second threshold (Riglet et al., col. 17, lines 15-21, *"First a fringe region RB is defined of a width of a few pixels (here 5, 3, or 10 pixels, depending on whether the CIF, QCIF or 4/3 format is involved), which runs all along the edge of each window and which forms a* ***transition zone in which the luminance will be made to vary****, here in linear fashion, thus creating a kind of gradient."*),

and having a gradient magnitude that is within the incrementally larger gradient tolerance value of the gradient magnitude of the incremental transition region pixel to which it is connected (Mukherjee et al., Paragraph [0061], *"The image gradient is compared to a gradient tolerance (Block 605). The gradient tolerance value is pre-specified along with the input mask.* If both the gradient (and curvature values, if necessary) are less than the gradient tolerance (and curvature tolerance, if necessary), then no further action is needed for that segment, and the next segment is evaluated (Block 604).").

The examiner takes into account that having a gradient magnitude that is within a gradient tolerance value for a pixel, the pixel can be any type of pixel in the digital image including a transition pixel.

7. Claims 8-10 25 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Riglet et al., US 5,631,975, Mukherjee et al., US2005/0055658 A1

and Harrington, US 6,580,812 B1 as applied to claim 7, 24, and 28 respectively above, and further in view of Avinash, US 6,173,083 B1 and Nichani 6,061,476.

Riglet et al., Mukherjee et al., and Harrington fail to teach using a focus parameter to calculate a transition region as well as to merge a defined number of the initial plus incremental transition regions into a single transition region and defining a final foreground mask as the initial foreground region; defining a final transition mask as the difference between the object region and the final foreground region; and defining a final background mask as the remainder of the image, however, Avinash and Nichani do:

Re claim 8, the method of claim 7, wherein the calculating a transition region further comprises: using a focus parameter (Avinash, col. 7, lines 38-44, "*This parameter may be set as a default value, or may be modified by an operator. In general, a higher additive value produces a sharper image, while a lower additive value produces a smoother image. This parameter, referred to in the present embodiment as the "focus parameter" may thus be varied to redefine the classification of pixels into structures and non-structures.*") to merge a defined number of the initial plus incremental transition regions into a single transition region (Nichani, col. 13, lines 59-65, "*Although in the method and apparatus described hereinbefore positive and negative channel*

images are described as logically ORed to merge and ultimately effect a single binary image, it will be appreciated that other means of combining the respective images, such as adding or the like, can be effected to arrive at images or an image representative of the logically combined images.").

Therefore, taking the combined teachings of Riglet et al., Mukherjee et al., Harrington, Avinash, and Nichani as a whole, it would have been obvious to modify Riglet et al., Mukherjee et al., and Harrington, to use a focus parameter to calculate a transition region as well as to merge a defined number of the initial plus incremental transition regions into a single transition region and defining a final foreground mask as the initial foreground region; defining a final transition mask as the difference between the object region and the final foreground region; and defining a final background mask as the remainder of the image.

Re claim 9, the method of claim 8, further comprising: defining an object region as the union of the initial foreground region and the single transition region, and performing at least one morphological operation on the object region (Riglet et al., Fig. 8 and col. 12, lines 20-31, *"To determine the displacements dx.sub.i, dy.sub.i of the various characteristic points i through translation and rotation, the displacement of the windows defined in characteristic zones of the face are followed as*

indicated in FIG. 8. Supposing that the person remains in the same plane throughout the sequence (to avoid having to take into account depth movements), the object is to find for each window of a given image, as shown in the said Figure, that one from among the windows which resembles it most inside a searching zone situated in the image following the said given image, by a resemblance criterion which is, for example, that of finding the minimum absolute error.").

Re claim 10, the method of claim 9, further comprising: defining a final foreground mask as the initial foreground region; defining a final transition mask as the difference between the object region and the final foreground region; and defining a final background mask as the remainder of the image (Nichani, col. 2, lines 17-38, *"In dynamic image subtraction methods, two images of the same part taken at two different points in time are subtracted. An example of a dynamic method implementing image subtraction is a solder paste inspection process that uses an image of a printed circuit board ("PCB") captured before solder is applied (a "pre-image"), and an image of the same PCB after solder is applied (a "post-image"), for inspection that determines whether the solder was properly applied to the PCB. The pre-image is subtracted from the post-image so that a respective difference image is*

generated for each PCB inspected during run time. The difference image is used to identify differences between the pre-image and the post-image, which correspond to areas where solder paste has been applied. After the image subtraction step, a thresholding step is necessary to binarize the difference image, assigning one value (i.e. "0") to gray values in the difference image that are less than the threshold value (background), and another value (i.e. "1") to gray values in the difference image that are equal to or greater than the threshold value (features of interest or foreground).").

Re claim 25, the product of claim 24, further comprising instructions for execution by the processing circuit for (Riglet et al. Fig. 1, Fig. 2):

defining a final foreground mask as the initial foreground region; defining a final transition mask as the difference between the object region and the final foreground region; and defining a final background mask as the remainder of the image (Nichani, col. 2, lines 17-38, *"In dynamic image subtraction methods, two images of the same part taken at two different points in time are subtracted. An example of a dynamic method implementing image subtraction is a solder paste inspection process that uses an image of a printed circuit board ("PCB") captured before solder is applied (a "pre-image"), and an image of the same PCB after*

solder is applied (a "post-image"), for inspection that determines whether the solder was properly applied to the PCB. The pre-image is subtracted from the post-image so that a respective difference image is generated for each PCB inspected during run time. The difference image is used to identify differences between the pre-image and the post-image, which correspond to areas where solder paste has been applied. After the image subtraction step, a thresholding step is necessary to binarize the difference image, assigning one value (i.e. "0") to gray values in the difference image that are less than the threshold value (background), and another value (i.e. "1") to gray values in the difference image that are equal to or greater than the threshold value (features of interest or foreground).").

Re claim 29, the product (Riglet et al. Fig. 1, Fig. 2) of claim 28, wherein the calculating a transition region further comprises: using a focus parameter (Avinash, col. 7, lines 38-44, *"This parameter may be set as a default value, or may be modified by an operator. In general, a higher additive value produces a sharper image, while a lower additive value produces a smoother image. This parameter, referred to in the present embodiment as the "focus parameter" may thus be varied to redefine the classification of pixels into structures and non-*

structures.") to merge a defined number of the initial plus incremental transition regions into a single transition region (Nichani, col. 13, lines 59-65, *"Although in the method and apparatus described hereinbefore positive and negative channel images are described as logically ORed to merge and ultimately effect a single binary image, it will be appreciated that other means of combining the respective images, such as adding or the like, can be effected to arrive at images or an image representative of the logically combined images."*).

8. Claims 11, 12, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Riglet et al., US 5,631,975, Mukherjee et al., US2005/0055658 A1, Harrington, US 6,580,812 B1, Avinash, US 6,173,083 B1, and Nichani 6,061,476 as applied to claim 8 and 25 above, and further in view of Braier et al. 5,694,478.

Riglet et al., Mukherjee et al., Harrington, Avinash, and Nichani fail to teach suppressing pixel intensities in the background region by gradually reducing the intensity of background pixels to zero as a function of their distance from the object region, however Braier does:

Re claim 11, the method of claim 8, further comprising: suppressing pixel intensities in the background region by gradually reducing the intensity of background pixels to zero as a function of their distance from the object region (Braier et al. Fig. 9, and col. 8, lines 45-51, *"In FIG. 9, the peak value, shown in bold, is*

eight. The difference in intensities between two time lapsed images appears in the difference image as a gaussian distribution. Thus, the peak value occurs near or at the center of the acid zone ***and dissipates gradually outward in all directions****, as can be seen by the numbers decreasing in value surrounding the peak value of eight in FIG. 9."*).

Where as Avinash shows the distribution as a bar graph in Figure 6., Braier shows it in matrix form. However, Avinash fails to state that the distribution is one of a Gaussian function. Therefore, taking the combined teachings of Riglet et al., Mukherjee et al., Harrington, Avinash, Nichani, and Braier as a whole, it would have been obvious to modify Riglet et al., Mukherjee et al., Harrington, Avinash, and Nichani to suppress pixel intensities in the background region by gradually reducing the intensity of background pixels to zero as a function of their distance from the object region.

Re claim 12, the method of claim 11, wherein the function comprises a linear ramp function, an exponential function, a Gaussian function, a Hanning function, a Hamming function, any function for reducing a value with respect to distance, or any combination of functions comprising at least one of the foregoing functions (Braier et al. Fig. 9, and col. 8, lines 45-51, *"In FIG. 9, the peak value, shown in bold, is eight. The difference in intensities between two time lapsed images appears in the difference image as a* ***gaussian***

distribution. *Thus, the peak value occurs near or at the center of the acid zone and dissipates gradually outward in all directions, as can be seen by the numbers decreasing in value surrounding the peak value of eight in FIG. 9."*).

Re claim 26, the product of claim 25, further comprising instructions for execution by the processing circuit for (Riglet et al. Fig. 1, Fig. 2):
suppressing pixel intensities in the background region by gradually reducing the intensity of background pixels to zero as a function of their distance from the object region (Braier et al. Fig. 9, and col. 8, lines 45-51, *"In FIG. 9, the peak value, shown in bold, is eight. The difference in intensities between two time lapsed images appears in the difference image as a gaussian distribution. Thus, the peak value occurs near or at the center of the acid zone* ***and dissipates gradually outward in all directions****, as can be seen by the numbers decreasing in value surrounding the peak value of eight in FIG. 9."*).

Re claim 27, the product (Riglet et al. Fig. 1, Fig. 2) of claim 26, wherein the function comprises a linear ramp function, an exponential function, a Gaussian function, a Hanning function, a Hamming function, any function for reducing a value with respect to distance, or any combination of functions comprising at least one of the foregoing functions (Braier et al. Fig. 9, and col. 8, lines 45-51, *"In FIG. 9, the peak*

value, shown in bold, is eight. The difference in intensities between two time lapsed images appears in the difference image as a ***gaussian distribution****. Thus, the peak value occurs near or at the center of the acid zone and dissipates gradually outward in all directions, as can be seen by the numbers decreasing in value surrounding the peak value of eight in FIG. 9.")*.

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Riglet et al., US 5,631,975 as applied to claim 13 above, and further in view of Nichani 6,061,476.

Riglet fails to teach defining a final foreground mask as the initial foreground region; defining a final transition mask as the difference between the object region and the final foreground region; and defining a final background mask as the remainder of the image, however, Nichani does:

Re claim 14, the method of claim 13, further comprising: defining a final foreground mask as the initial foreground region; defining a final transition mask as the difference between the object region and the final foreground region; and defining a final background mask as the remainder of the image (Nichani, col. 2, lines 17-38, *"In dynamic image subtraction methods, two images of the same part taken at two different points in time are subtracted. An example of a dynamic method implementing image subtraction is a solder*

paste inspection process that uses an image of a printed circuit board ("PCB") captured before solder is applied (a "pre-image"), and an image of the same PCB after solder is applied (a "post-image"), for inspection that determines whether the solder was properly applied to the PCB. The pre-image is subtracted from the post-image so that a respective difference image is generated for each PCB inspected during run time. The difference image is used to identify differences between the pre-image and the post-image, which correspond to areas where solder paste has been applied. After the image subtraction step, a thresholding step is necessary to binarize the difference image, assigning one value (i.e. "0") to gray values in the difference image that are less than the threshold value (background), and another value (i.e. "1") to gray values in the difference image that are equal to or greater than the threshold value (features of interest or foreground).").

Therefore, taking the combined teachings of Riglet et al. and Nichani as a whole, it would have been obvious to modify Riglet et al. to define a final foreground mask as the initial foreground region; defining a final transition mask as the difference between the object region and the final foreground region; and defining a final background mask as the remainder of the image

10. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Riglet et al., US 5,631,975 and Nichani 6,061,476 as applied to claim 14 above, and further in view of Braier et al. 5,694,478.

Riglet et al. and Nichani fail to teach suppressing pixel intensities in the background region by gradually reducing the intensity of background pixels to zero as a function of their distance from the object region, however Braier does:

Re claim 15, the method of claim 14, further comprising: suppressing pixel intensities in the background region by gradually reducing the intensity of background pixels to zero as a function of their distance from the object region (Braier et al. Fig. 9, and col. 8, lines 45-51, "*In FIG. 9, the peak value, shown in bold, is eight. The difference in intensities between two time lapsed images appears in the difference image as a gaussian distribution. Thus, the peak value occurs near or at the center of the acid zone* ***and dissipates gradually outward in all directions****, as can be seen by the numbers decreasing in value surrounding the peak value of eight in FIG. 9.*").

Therefore, taking the combined teachings of Riglet et al., Nichani, and Braier as a whole, it would have been obvious to modify Riglet et al. and Nichani to suppress pixel intensities in the background region by gradually reducing the intensity of background pixels to zero as a function of their distance from the object region.

Re claim 16, the method of claim 15, wherein the function comprises a linear ramp function, an exponential function, a Gaussian function, a Hanning function, a Hamming function, any function for reducing a value with respect to distance, or any combination of functions comprising at least one of the foregoing functions (Braier et al. Fig. 9, and col. 8, lines 45-51, *"In FIG. 9, the peak value, shown in bold, is eight. The difference in intensities between two time lapsed images appears in the difference image as a* ***gaussian distribution****. Thus, the peak value occurs near or at the center of the acid zone and dissipates gradually outward in all directions, as can be seen by the numbers decreasing in value surrounding the peak value of eight in FIG. 9."*).

11. Claim 17 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Riglet et al. as applied to claim 1 above, and further in view of Avinash, US 6,173,083 B1.

Riglet et al. fails to teach using a digital image that is created from a medical imaging process, however, Avinash does:

Re claim 17, the method of claim 1, wherein the digital image is a digital image of a biological object obtained using MR imaging, CT imaging, Ultrasound imaging, X-ray imaging, or any combination comprising at least one of the foregoing imaging

processes (Avinash, col. 1, lines 18-22, "*The data defining each pixel may be acquired in various manners, depending upon the imaging modality employed. Modalities in medical imaging, for example, include magnetic resonance imaging techniques, X-ray techniques, and so forth.*").

Riglet et al. uses an imaging process mentioned within the reference to create a digital image, which can be one of a biological object. The method of obtaining this biological object is thus taught in Avinash. Therefore, taking the combined teachings of Riglet et al. and Avinash as a whole, it would have been obvious to modify Riglet et al., to obtain the image through medical imaging processes.

Re claim 30, the product (Riglet et al. Fig. 1, Fig. 2) of claim 18, wherein the digital image is a digital image of a biological object obtained using MR imaging, CT imaging, Ultrasound imaging, X-ray imaging, or any combination comprising at least one of the foregoing imaging processes (Avinash, col. 1, lines 18-22, "*The data defining each pixel may be acquired in various manners, depending upon the imaging modality employed. Modalities in medical imaging, for example, include magnetic resonance imaging techniques, X-ray techniques, and so forth.*").

Examiner's Note

The referenced citations made in the rejection(s) above are intended to exemplify areas in the prior art document(s) in which the examiner believed are the most relevant to the claimed subject matter. However, it is incumbent upon the applicant to analyze the prior art document(s) in its/their entirety since other areas of the document(s) may be relied upon at a later time to substantiate examiner's rationale of record. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). However, "the prior art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed…." In re Fulton, 391 F.3d 1195, 1201, 73 USPQ2d 1141, 1146 (Fed. Cir. 2004).

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Vanchy Jr. whose telephone number is (571) 270-1193. The examiner can normally be reached on Monday - Friday 7:30 am - 5:00 pm Alt. Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vu Le can be reached on (571) 272-7332. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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